



Europäisches Patentamt  
European Patent Office  
Office européen des brevets



Publication number: **0 505 037 A1**

12

## EUROPEAN PATENT APPLICATION

21 Application number: **92301420.3**

51 Int. Cl.<sup>5</sup>: **A61M 16/00**

22 Date of filing: **20.02.92**

30 Priority: **20.03.91 US 672462**

43 Date of publication of application:  
**23.09.92 Bulletin 92/39**

84 Designated Contracting States:  
**AT BE CH DE DK ES FR GB GR IT LI LU MC  
NL PT SE**

71 Applicant: **N.A.D., INC.**  
**148 B Quarry Road**  
**Telford, Pennsylvania 18969(US)**

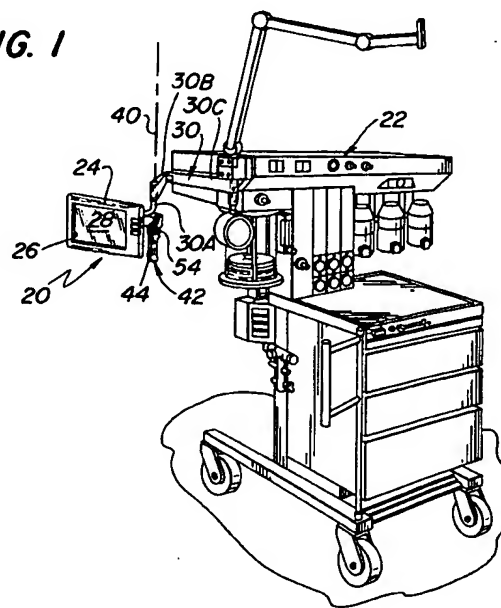
72 Inventor: **Schrelber, Peter J.**  
**2316 Riverbend Road**  
**Allentown, Pennsylvania 18103(US)**  
Inventor: **Schreiber, Joachim M.**  
**777 Moccasin Drive**  
**Harleysville, Pennsylvania 19438(US)**

74 Representative: **Shaw, Laurence**  
**George House George Road**  
**Edgbaston Birmingham B15 1PG(GB)**

54 **Control/display panel for medical apparatus.**

57 A control/display panel (20) for controlling and visually displaying operating conditions and functions of associated apparatus, e.g. an anesthesia machine (22) is manually movable and includes a pistol grip handle (44) having a trigger (52) and a rotary selector member (54) mounted thereon. The pistol grip (44) is used to move the panel (20) to the desired position and/or orientation and to hold it stationary while the selector member (54) and trigger (52) are operated.

**FIG. 1**



**EP 0 505 037 A1**

This invention relates to panels for controlling the operation of medical apparatus such as anesthesia machines and for providing a visual display of various data associated therewith.

It is known to provide anesthesia machines with control panels to effect the operation of the machine and to provide visual indications of various operating conditions/functions of the machine as well as monitored patient data, e.g. pulse rate, oxygen saturation, blood pressure, etc. Such panels and their associated actuators, e.g. buttons, switches, etc. have typically been located at fixed positions on the machine.

It is one object of this invention to provide a panel for apparatus which panel can be readily moved to a desired position and orientation with respect to the apparatus for effecting the convenient operation of the apparatus via the control panel. It is another object of this invention to provide a panel as indicated and which can provide a visual display of various operating parameters and can enable the user to select the various visual displays. It is another object of this invention to provide a panel as indicated and which can be held stationary by the user while manual inputs are provided thereto.

In one aspect the invention provides a panel having manually actuatable means to control apparatus associated therewith characterised in that the panel is connected to the apparatus by moveable means arranged to orient the panel with respect to the apparatus, and in that handle means are present on the panel to orient the panel with respect to the apparatus and in that actuator means are present on the panel to input control and/or visual data.

Preferably the actuator means includes selection means arranged to be actuated by the user when gripping the handle means. Preferably the selection means is a rotary member arranged sequentially to select each control function of the apparatus.

The handle means is arranged to be readily gripped by the user to hold the control panel stationary. The actuator means is arranged to be operated by the user when the panel is stationary to provide the input to the apparatus.

In one preferred embodiment of the apparatus the control panel includes a screen for visually displaying various operations/functions of the apparatus. In that embodiment the handle means is in the form of a pistol grip, and the actuator means is in the form of rotary selector and a trigger mechanism mounted on the pistol grip. The selector switch is arranged to be operated by the user's thumb when the pistol grip is in the user's hand to effect some change in the display/operation of the machine, e.g. to move a cursor on the screen to a

desired operation/function, to change a displayed value, or effect some other operation. The trigger mechanism is arranged to be operated by the user's finger when the pistol grip is in the user's hand to effect some operation or change in the display or operation of the machine, e.g. to move a cursor on the screen to a desired operation/function, to initiate a selected operation/function, etc.

Preferably the rotary member comprises an optical encoder.

Preferably the panel is connected to the apparatus by an articulated arm arranged to orient the panel about any vertical axis.

In order that the invention may be well understood it will now be described by way of example with reference to the accompanying drawings wherein:

Figure 1 is a perspective view of an anesthesia machine including a panel of the invention;

Figure 2 is a perspective view, partially exploded, of the panel shown in Figure 1;

Figure 3 is an enlarged front elevation of the panel shown in Figure 2; and

Figure 4 is an enlarged section taken along lines 4-4 on Figure 3.

A panel assembly 20 connected to an anesthesia machine 22 comprises a housing 24 having a window 26 in which a display panel, e.g. an electroluminescent screen, 28 is mounted. The panel may be that sold by Finlux under the part number MD640.40052.

The housing 24 is mounted on a moveable (e.g., articulated) arm 30 by a mounting bracket formed of two components 32A and 32B (Figure 2). The bracket component 32B is secured to the rear of the housing 24. The arm 30 includes an L-shaped, rod-like arm section 30A having a horizontal leg received within opposite grooves 34 in the bracket components 32A and 32B. The bracket components 32A and 32B are secured together by threaded fasteners (not shown) extending through aligned holes. The grooves 34 form a passageway in which the horizontal leg of the arm section 30A is journaled so that the arm section may be rotated therein to tilt the panel 20 with respect to a horizontal axis 38 centered through the passageway. That arm section is pivotally movable about a vertical axis 40 extending through a joint at the end of leg 30B of the arm 30. The section 30B is pivotally connected to another arm section 30C associated with the machine 22. As a result the panel 20 can be pivoted about any vertical axis, such as axis 40, and the arm sections extended to enable the panel assembly 20 to be positioned at various locations with respect to the machine 22 by a handle 42. The handle comprises an ergonomically shaped pistol-like hand grip 44 secured to the housing 24

by the bracket section 32B. The hand grip 44 is made up of sections 44A and 44B which are secured together and to the bracket section 32A by threaded fasteners (not shown).

As shown in Figures 2 and 4, an arcuate recess 50 is located at the rear side 48 of the hand grip 44 at the upper end thereof. A trigger mechanism 52 is located within the recess 50 so that it can be actuated, e.g. depressed, by the user's index finger when he/she grasps the hand grip 44. A rotary selector wheel 54 is mounted at the front side 46 of the hand grip 44 generally opposite the trigger mechanism so that the wheel can be rotated by the user's thumb when he/she grasps the hand grip. The wheel is arranged to be rotated about a horizontal axis 56 extending parallel to the axis 38 and perpendicularly to the longitudinal axis of the hand grip 44.

The trigger mechanism and the rotatable selector wheel are arranged to be manually operated by the user to input instructions to the anesthesia machine 22. The trigger mechanism comprises a button or trigger element 58 having an ergonomically shaped arcuate surface 58A to be engaged by the user's index finger. The trigger element 58 is pivotally mounted on a pivot pin 60 bridging the two hand grip sections 44A and 44B. A conventional electrical microswitch 62 is mounted within the grip sections 44A and 44B adjacent the trigger element 58. The trigger element is biased outward by a compression spring 58B located within a hole 58C in the rear of the trigger element and a corresponding hole 58C in the hand grip section 44A. When the trigger element is depressed (pulled back) it pivots inward slightly to engage the microswitch's actuating lever 62A to close the contacts (not shown) in the microswitch, thereby providing an electrical signal via conductors 62B, to the panel assembly 20 and from there to the machine 22.

The selector or "thumb" wheel 54 is coupled to an optical shaft encoder 64, such as that sold by Hewlett Packard Company under the part designation HPRG-AD32 #13C for providing electrical signals. The encoder 64 is mounted within the hand grip section 44A under a cover 66. The cover 66 comprises a hollow disc-shaped member having a plurality, e.g. three, recesses or notches 68 at 90 degrees about the periphery. Each recess includes an aperture 70 therein through which a respective threaded fastener (not shown) extends into a corresponding hole 72 in the hand grip section 44A to secure the cover to the hand grip section. The cover 66 includes a central opening 74 through which the rotatable shaft 76 of the optical encoder 64 extends. That shaft is secured via a set screw 54A to the thumb wheel so that rotation of the thumb wheel about axis 56 effects the concomitant

rotation of the encoder's shaft. The optical encoder is arranged to provide output signals via a flat or ribbon conductors 64A (Figure 4) upon the rotation of the thumb wheel 54 about axis 56. Turning the thumb wheel 54 vertical upwards produces an "increment", signal, and turning the wheel vertically downward produces a "decrement", signal.

Referring now to Figure 3, the screen 28 is shown in a "select" mode, wherein predetermined system/patient data and machine options or functions are displayed for user selection (input) on screen icons of the soft key type.

Operation of the control/display panel is as follows. The user grasps the hand (pistol) grip in his/her hand to move the panel to a desired convenient position/orientation. With the pistol grip in the user's hand he/she then places his/her index finger on the trigger and his/her thumb on the thumb wheel to sequence through various operations of the machine as selected by the user. In this regard, when the control/display is in a "select" mode, the visual displays on the screen will be as shown in Figure 3.

Each soft key includes a legend describing a respective function. In the "select" mode the soft keys are a "machine" soft key 80, a "configure" soft key 82, an "alarm on/off" soft key 84, a "trace/trend" soft key 86, an "alarm on/off" soft key 88, a "trace/trend" soft key 90, and an "auto-set" soft key 92. To the left of those soft keys are three graphs 94, 96, and 98, of system/patient parameters/conditions. Thus, the upper graph 94 represents the oxygen concentration trend during a designate time period, e.g. of 8:30 to 9:00 o'clock. The middle graph 96 represents the tidal volume, and the lower graph 98 represents the patients' blood pressure. To the left of each of the graphs are displays of data corresponding to the graphs. Thus, to the left of the oxygen concentration trend graph 94 is a box 100 displaying oxygen concentration data/limits, i.e. present concentration ("43"), lower limit ("30"). To the left of the tidal volume graph 96 is a box 102 displaying various data relating to that graph. In a similar manner to the left of the blood pressure graph 98 is a box 104 displaying the data relating to that graph.

Incrementally moving the thumb wheel moves a cursor sequentially through the soft keys so that the user can operate the machine as desired. For example, when the cursor is on the "machine" soft key 80 rotating the thumb wheel downward moves the cursor to the "configure" soft key 82. Further rotation of the thumb wheel in that direction moves the cursor to the "alarm on/off" soft key 84. Should the user wish the machine 22 to provide a tidal volume alarm, when cursor is on the soft key 84 the trigger is then depressed to move (toggle) the cursor to the alarm on soft key portion (if it is not

on that soft key portion already). This action initiates that alarm function. If no alarm is desired the trigger is depressed to toggle the alarm to the "off" portion of the soft key, thereby disabling the tidal alarm. Further rotation of the thumb wheel in the increment direction then moves the cursor to the trace/trend soft key 86. Should the user of the machine wish to display the monitored tidal flow data in graphical form over a short period of time, the trigger is pulled (depressed) when the cursor is on the "trace" portion of the soft key 86. A graphical display like that designated by the reference number 94 is produced. If it is desired to display that parameter over a longer period of time to represent a trend in that parameter, the trigger is again pulled to move (toggle) the cursor to the "trend" portion of the soft key 86, whereupon the trend of that parameter over time is displayed graphically. Incrementing the thumb wheel then moves the cursor to the alarm on/off soft key 88 to set or disable a maximum blood pressure alarm. The selection of whether the alarm is on or off is effected by pulling the trigger to toggle cursor to the soft key back portion for the desired function. Incrementing the thumb wheel then moves the cursor to the trace/trend soft key 90 to enable the user to select the blood pressure display in either the trace mode (as shown by 98) or the trend mode by suitable depression (toggling) of the trigger to either the trace or trend function. Incrementing the thumb wheel next moves the cursor to the auto-set function soft key 92. This function establishes the blood pressure alarm threshold at a predetermined value, e.g. 4 cm below peak pressure. Further, incrementing of the thumb wheel causes the cursor to move to the data display box 100 and in particular to the upper limit value of the oxygen concentration to allow the user to adjust that value, if desired. To achieve that end the user merely pulls the trigger when the cursor is on the upper limit of the oxygen concentration. The value may now be changed. Thus to set or adjust that value from the value presently displayed (i.e., "60"), all that is necessary is to increment or decrement the thumb wheel to raise or lower that limit, respectively, as desired. Establishment of the low limit for the oxygen concentration is effected in a similar manner. If it is desired to calibrate the oxygen sensor, the thumb wheel is incremented to move the cursor to the "cal" soft key, whereupon the trigger is then depressed to effect the calibration of the oxygen sensor.

Operation of the control/display panel assembly 20 to effect adjustment of title volume, blood pressure, etc. is accomplished in a similar manner by use of the thumb wheel and trigger.

## Claims

1. A panel (20) having manually actuatable means to control apparatus (22) associated therewith characterised in that the panel (20) is connected to the apparatus (22) by movable means (30) arranged to orient the panel (20) with respect to the apparatus (22), and in that handle means (42) are present on the panel (20) to orient the panel (20) with respect to the apparatus (22) and in that actuator means (52) are present on the panel (20) to input control and/or visual data.
2. A panel according to Claim 1 characterised in that the actuator means (52) includes selection means (54) arranged to be actuated by the user when gripping the handle means (42).
3. A panel according to Claim 2 characterised in that said selection means (54) comprises a rotary member.
4. Apparatus according to Claim 3 characterised in that rotation of the rotary member (54) is arranged sequentially to select each control function of the apparatus (22).
5. A panel according to Claim 3 or 4 characterised in that the rotary member (54) comprises an optical encoder (64).
6. A panel according to any preceding Claim characterised in that the handle means (42) is in the shape of a pistol grip (44), the actuator means (52) comprises a trigger-like member mounted on the pistol grip (44) arranged to be engaged by the user's finger, and the rotary member (54) is mounted on the pistol grip (44) and arranged to be engaged by the user's thumb.
7. A panel according to any preceding Claim characterised in that the actuator means (52) is arranged to select one or more visual displays (94,96,98) on the display panel (20).
8. Apparatus according to any preceding Claim characterised in that the panel (20) is connected to the apparatus (22) by an articulated arm (30) arranged to orient the panel (20) about any vertical axis (40).
9. A panel according to any preceding Claim characterised in that said apparatus (22) comprises an anesthesia machine.
10. Apparatus (22) characterised in that it is controlled by a panel (20) according to any pre-

ceding Claim.

5

10

15

20

25

30

35

40

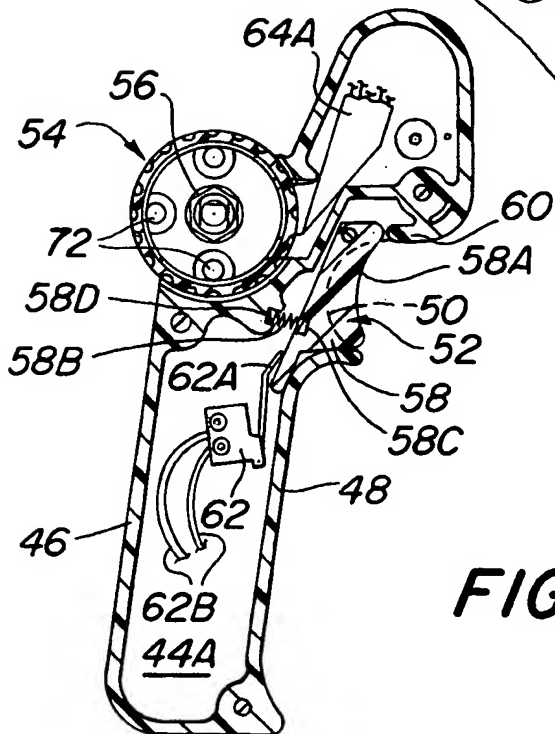
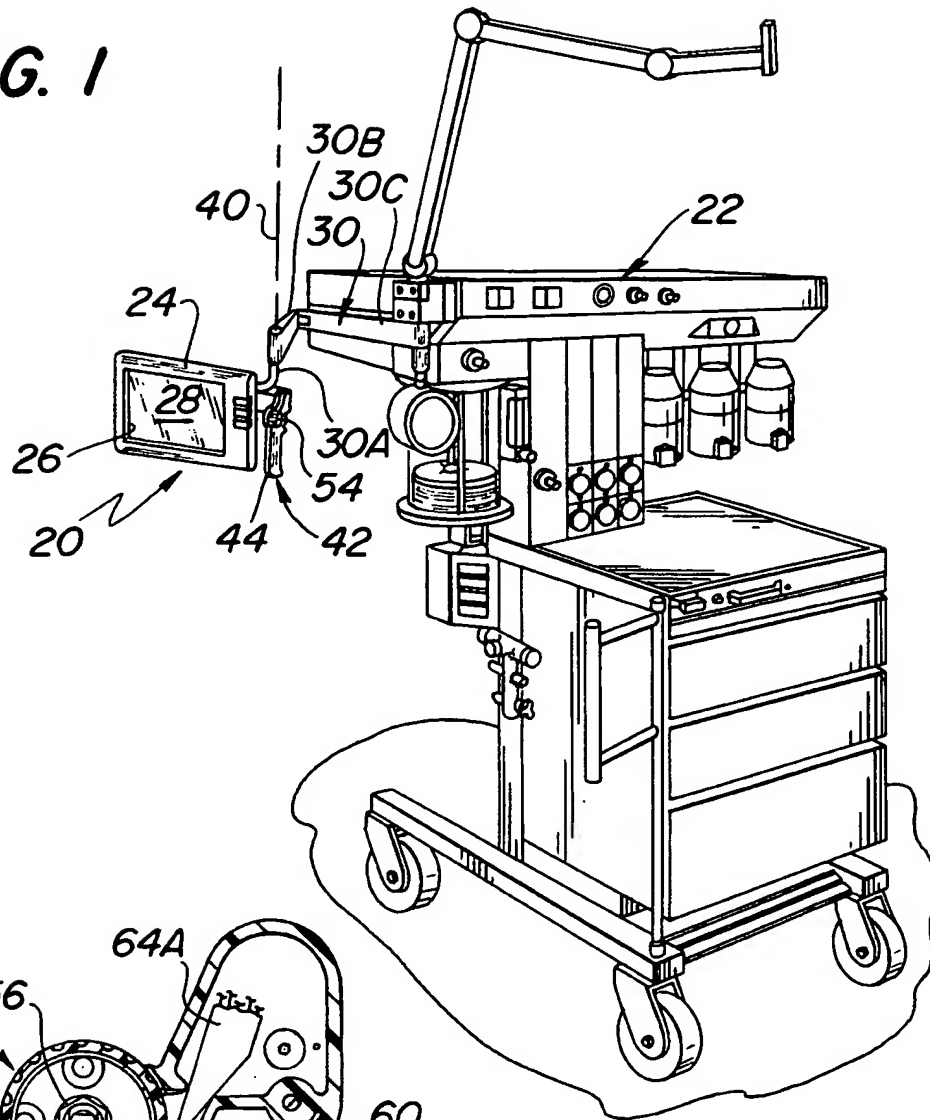
45

50

55

5

**FIG. 1**



**FIG. 4**

**FIG. 2**

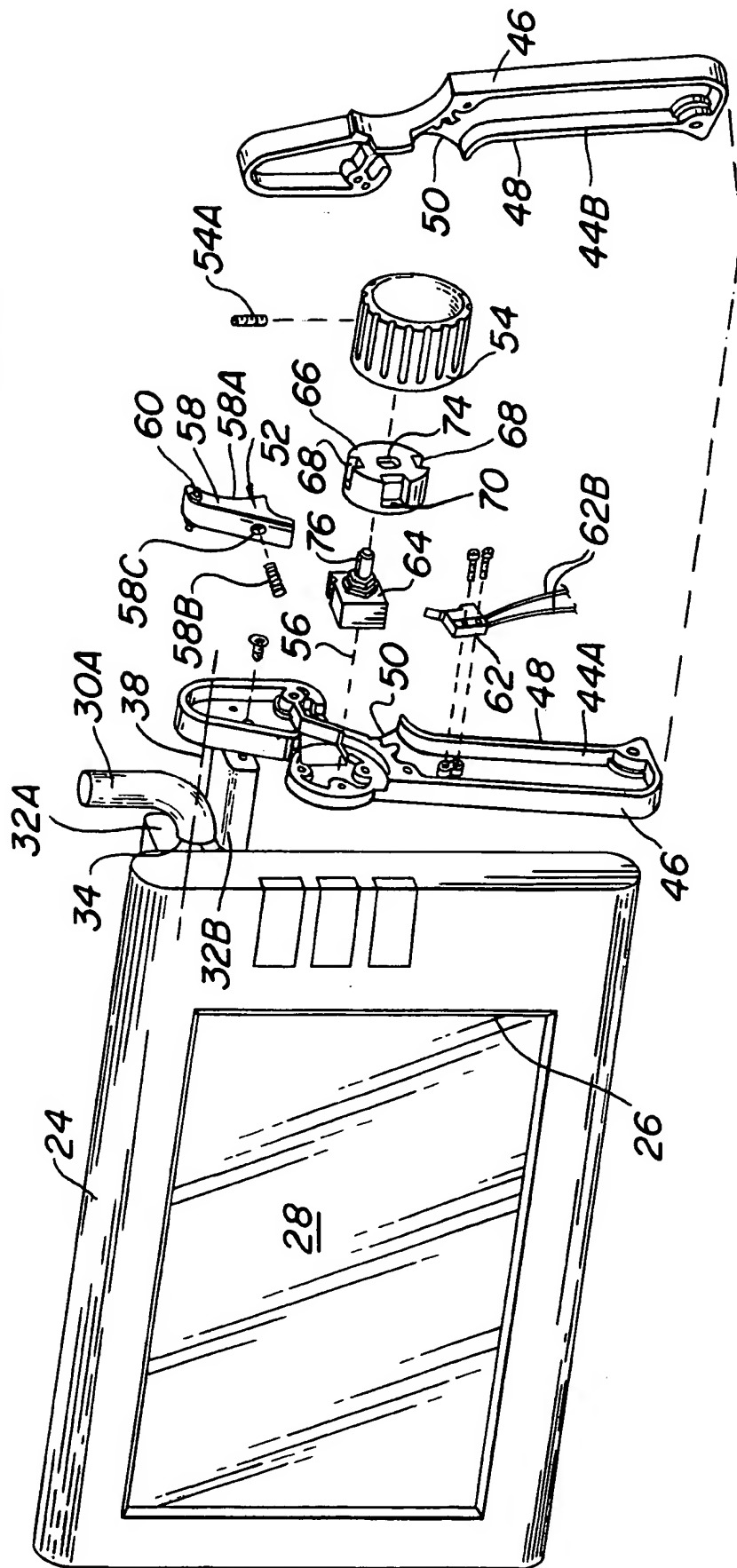
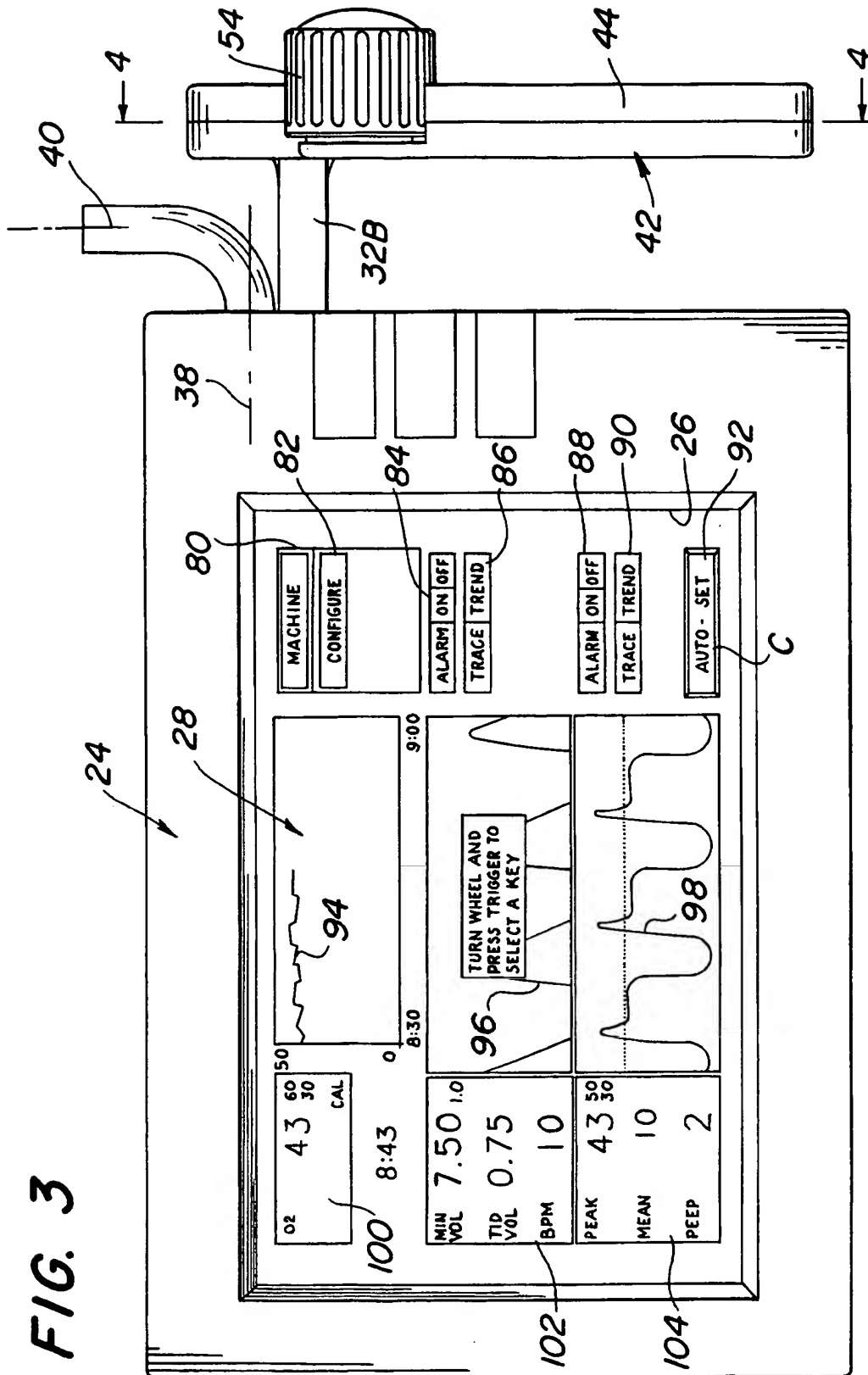


FIG. 3







European Patent  
Office

## EUROPEAN SEARCH REPORT

Application Number

EP 92 30 1420

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	EP-A-0 274 996 (ELMED GINEVRI S.R.L.) * abstract; figures 1,4 * ---	1	A61M16/00
A	WO-A-8 100 675 (HOVMAND) * abstract; figure 3 * * page 6, line 4 - line 17 * ---	1	
A	IEEE ENGINEERING IN MEDICINE & BIOLOGY vol. 1, no. 1, March 1982, NEW YORK, USA pages 36 - 42; ANTHONY: 'BAS a major change coming in delivery' * figures 1-4 * ---	1	
A	GB-A-2 047 380 (DRÄGERWERK AKTIENGESELLSCHAFT) * abstract; figures * * page 2, line 5 - line 18 * ---	1	
A	EP-A-0 215 212 (TRILUX-LENZE GMBH & CO.) * abstract; figures 1,6 * * column 5, line 1 - line 13 * ---	1	
A	FR-A-1 549 993 (OYMO INDUSTRIES INC.) * page 3, left column, line 7 - right column, line 18; figures * -----	1	TECHNICAL FIELDS SEARCHED (Int. Cl.5)  A61M A61G
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 01 JUNE 1992	Examiner ZEINSTR A. H.
<b>CATEGORY OF CITED DOCUMENTS</b> X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document  T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ..... & : member of the same patent family, corresponding document			

**This Page is Inserted by IFW Indexing and Scanning  
Operations and is not part of the Official Record**

**BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ BLACK BORDERS
- ☐ IMAGE CUT OFF AT TOP, BOTTOM OR SIDES
- ☐ FADED TEXT OR DRAWING
- ☒ BLURRED OR ILLEGIBLE TEXT OR DRAWING
- ☐ SKEWED/SLANTED IMAGES
- ☐ COLOR OR BLACK AND WHITE PHOTOGRAPHS
- ☐ GRAY SCALE DOCUMENTS
- ☐ LINES OR MARKS ON ORIGINAL DOCUMENT
- ☐ REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY
- ☐ OTHER: \_\_\_\_\_

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.**